



312066 0270 8081 8



*Office of Technical Assistance*  
**Executive Office of Environmental Affairs**  
**Commonwealth of Massachusetts**

# **Toxics Use Reduction Case Study**

## **MATERIALS MANAGEMENT YIELDS MAJOR SAVINGS FOR ANITEC**

### **SUMMARY**

In 1984, Anitec Printing Plates first began integrating toxics use reduction techniques into the procedures and processes used to make its products for the lithographic printing industry. The initial motivation came from discovering the low quality of incoming chemicals and a policy of reducing waste and improving production efficiency. The company hired an analytic chemist, installed a laboratory and began testing incoming shipments of chemicals and working closely with vendors. From a high of 800 barrels of rejected chemicals in the first year of testing, Anitec now rejects fewer than 20 barrels a year. Other successful TUR projects over the years have employed most of the TUR techniques — but have mainly focused on management and operations — and have saved Anitec hundreds of thousands of dollars, reduced wastes and emissions by thousands of pounds and significantly increased productivity and production throughput.

### **BACKGROUND**

Anitec Printing Plates has always been committed to operating in complete compliance with all environmental health and safety regulations. The 20-year-old company, which was acquired in 1990 by International Paper's Imaging Products Division, employs approximately 300 people at their two facilities in Holyoke, Massachusetts. Anitec's products for the lithographic printing industry include plates, processing chemicals and processors. Anitec uses TURA reportable quantities of nine chemicals, some of which become part of the finished product, while others become emissions that must be captured or wastes that must be managed as hazardous byproduct. The company receives in aggregate over 400,000 pounds a month of listed and unlisted chemicals.

### **TOXICS USE REDUCTION PLANNING**

When Anitec began to recognize that the poor quality of incoming chemicals led to downtime and wasted chemicals, the company initiated top to bottom examination of its materials acquisition, storage and handling, manufacturing processes, and maintenance procedures.

Much of the planning and implementation of changes was developed and carried out by teams



## TUR TECHNIQUES EMPLOYED

**Process Redesign:** Prior to installation of a centrifuge, Anitec allowed the drums of coating it mixes inhouse to stand so that impurities would settle to the bottom. The material at the top, presumably free of contaminants, would be removed for use. Now, a centrifuge has reduced mixing and settling time from 36 hours to about 10 hours and has significantly reduced generated wastes. This has resulted in higher BRIs for two chemicals used in the coating formulations, 2-methoxyethanol and 2-ethoxyethanol. Anitec can now mix coatings on demand, which reduces both the cost of labor to mix the coatings and the quantity of stored chemicals.

**Improved Operations and Maintenance:** In addition to the quality standards for incoming raw materials, Anitec improved preventative maintenance schedules to reduce downtime and lost material resulting from machinery failure. Anitec has also installed process monitoring and control equipment. This will allow temperature control for sensitive anodizing operations, auto titration to insure proper bath concentrations and automatic acid additions to etch tanks to maintain pH. The entire process can be monitored, and eventually controlled as well, through a PC network system. Overall, operating procedures have been improved wherever possible to prevent or reduce the generation of waste.

**In-Process Recycling and Reuse:** Anitec installed an inline ion exchange system which filters contaminants out of a sulfuric acid bath. This acid recycling system has tripled the life of the bath from one to three weeks. This results in 66% less raw material purchased and waste generated.

**Resource Conservation:** Anitec has not confined its activities to toxic chemicals. By actively pursuing water flow reduction, Anitec has cut water discharge by 20%, down 100,000 gallons per day at each facility. This was accomplished through the use of cascaded rinses, flow restriction nozzles and other procedure changes. Anitec identified these options during water audits which included measuring water flows through process lines.

**Input Substitution:** Anitec has been actively researching, testing and implementing input substitutions and product reformulations whenever possible. While these activities are currently confidential, one change resulted in the elimination of cyclohexanone, cyclohexanol and acids in developers. The aqueous and biodegradable reformulated product eases regulatory and reporting requirements of Anitec's customers.

## RESULTS

**Reductions Achieved:** While it is difficult to accurately assess the effect all of these TUR activities on Anitec's waste generation and chemical use, the company reduced its use of reportable chemicals by over 1 million pounds between 1989 and 1991. The table above shows some of the specific chemical BRIs which contribute to the company-wide 1991 BRI of 37.

**Anitec's BRI's for 1991**

	Location 1	Location 2
Hydrochloric acid	21.0	82.0
Phosphoric acid	32.0	44.0
Nitric acid	7.9	1.4
Sulfuric acid	36.0	53.0

**Economics:** The purchase of the analytical lab cost Anitec nearly \$300,000 plus the cost of a building and the addition of a chemist. The company estimates that this mid-1980s investment was



of Anitec employees who collectively had the experience to solve the identified problems. The process starts with identifying a problem. Then areas of expertise necessary to solving the problem are identified and persons having these skills are made available.

Anitec had no quality standards for and did no testing of incoming raw materials. The quality of the chemicals was not checked until batches had already been mixed. This was far too late in the process to prevent inclusion of poor quality chemicals, which then necessitated disposal of whole batches of mixed chemicals. Anitec purchased analytical lab equipment and hired an analytical chemist, who began checking every barrel of incoming raw material.

The teams developed quality standards, improved operating procedures, improved preventative maintenance and improved vendor relations. The company also instituted an employee suggestion program that encourages and rewards successful proposals from individual workers.

In addition, Anitec personnel attended OTA workshops where they learned how the company's material and operations management efforts could be integrated with the goals of the Toxics Use Reduction Act.

### **TUR AT ANITEC 1984 -**

<b>TUR Technique</b>	<b>Year Introduced</b>
Product development (Confidential)	Ongoing
Process development (Confidential)	Ongoing
Ion exchange to prolong acid life	1984
Replacement of ethylene dichloride	1987
Analytical methods	1989
Operating procedures	1989
Vendor relations	1989
Quality standards	1989
Team management	1989
Water flow reduction	1989
Preventative maintenance improved	1990
Wastewater treatment operation	1991
Centrifuge of impurities	1992
Suggestion program	1992
Process monitoring/control equipment	1993

### **TOXICS USE REDUCTION MODIFICATIONS**

Anitec's earliest TUR modification was installation of an inline ion exchange system that removes contaminants from a sulfuric acid anodizing bath. The new system has tripled the life of the bath from one to three weeks, resulting in a 2/3 reduction in acid purchased and waste generation. In 1989, the first year of testing, the analytical chemist rejected nearly 800 barrels of below quality material. Working with its suppliers, Anitec developed and tightened material specifications to the point where now the chemist only needs to use statistical analysis. The vendors check their chemicals themselves and face loss of business if quality cannot be assured. With this new system, Anitec now rejects fewer than 20 barrels a year.

Anitec has implemented a wide variety of TUR projects of nearly every TUR technique. The entire production process, its many chemical inputs, maintenance and operations and scheduling have all been targeted for scrutiny. This has resulted in a byproduct reduction index (BRI) of 37, indicating a 37% reduction in toxic waste generation per unit of product. The BRI is calculated by doing year-to-year comparisons of waste generated per unit produced (i.e., square foot of cloth, or plated pen). An positive BRI indicates that less waste is generated for each item produced when compared to a base year.

recouped within a year, and that its TUR projects have typically generated paybacks within a few months. In 1991, Anitec saved \$283,000 in TURA chemicals compared to purchases in 1989. This saving reflects purchase only and does not include costs for handling, processing and treatment.

For more information about the TUR projects discussed in this case study, contact Anitec Toxic Use Reduction Planner Steve Sabourin, 413-538-5493 ext. 286.

*This Case Study is one of a series of such documents prepared by the Office of Technical Assistance for Toxics Use Reduction (OTA), a branch of the Massachusetts Executive Office of Environmental Affairs whose mission is to assist industry in reducing the use of toxic substances and/or the generation of toxic manufacturing byproducts. OTA's confidential, nonregulatory services are available at no charge to Massachusetts businesses and institutions that use toxic chemicals. For further information about this or other case studies, or about OTA's technical services, contact: Office of Technical Assistance, Executive Office of Environmental Affairs, Room 2109, 100 Cambridge Street, Boston, Massachusetts 02202, (617) 727-3260.*